

**CLEAN VERSION OF AMENDMENTS**

**IN THE CLAIMS**

Please amend claims 13, 19, 21, 24, 38, and add new claims 42-52 as follows:

13. (amended) A composite comprising

Aa) at least one first layer which comprises a mixture Ia, comprising a mix IIa consisting of

a) from 1 to 95% by weight, based on mix IIa, of an inorganic solid which conducts Li ions, having a primary particle size of from 5 nm to 20  $\mu$ m and

b) from 5 to 99% by weight, based on mix IIa, of a polymeric composition IV obtained by polymerization of

b1) from 5 to 100% by weight, based on the composition IV, of condensation product V of

$\alpha$ ) at least one compound VI which is able to condense with a carboxylic acid or a sulfonic acid as defined in  $\beta$  or a derivative or a mixture of two or more thereof, and

$\beta$ ) at least 1 mol per mol of the compound VI of a carboxylic acid or sulfonic acid VII which contains at least one free-radically polymerizable functional group, or a derivative

D2

thereof or a mixture of two or more thereof,

and

- b2) from 0 to 95% by weight, based on the composition IV, of a further compound VIII, having a mean molecular weight (number average) of at least 5000 and polyether segments in the main chain or a side chain, where the proportion by weight of the mix IIa in the mixture Ia is from 1 to 100% by weight, and the layer is free of an electron-conducting, electrochemically active compound,

and

- B) at least one second layer which comprises a polymeric binder and an electron-conducting, electrochemically active compound,

wherein the first layer or layers and the second layer or layers are joined to one another by one of the two methods V1 or V2:

- V1) Lamination of the first layer or layers with the second layer or layers under the action of heat or under the action of heat and pressure, or
- V2) Corona treatment of the first layer or layers and the second layers or layers and subsequent bringing together of the corona-treated first layer or layers with the corona-treated second layer or layers.

D2 19. (amended) A process for producing a composite as claimed in claim 13, which comprises joining the first layer or layers and the second layer or layers to one another by hot lamination.

D3 21. (amended) A process for producing a composite as claimed in claim 13, which comprises subjecting the first layer or layers or the second layer or layers or the first layer or layers and the second layer or layers to a corona treatment and subsequently bringing together the first corona-treated layer or layers to the second corona-treated or untreated layer or layers.

87 24. (amended) A method of producing an electrochemical cell in a sensor, an electrochromic window, a display, a capacitor or an ion-conducting film which comprises utilizing the composite of claim 13.

D5 38. (amended) A method of producing an automobile battery, instrument battery, planar battery or polymer battery which comprises utilizing the electrochemical cell of claim 27.

42. (new) A composite as claimed in claim 13, wherein the inorganic solid which conducts Li ions is a basic solid.

D6 43. (new) A composite as claimed in claim 13, wherein the inorganic solid which conducts Li ions is selected from the group consisting of lithium borates, lithium aluminates, lithium aluminosilicates, mica, lithium zeolites, lithium carbides,  $\text{Li}_3\text{N}$ , lithium oxides, mixed lithium oxides,  $\text{Li}_2\text{NH}$ ,  $\text{LiNH}_2$ , lithium phosphates,  $\text{Li}_2\text{CO}_3$ , lithium silicates, and lithium sulfates, and also two or more of the

abovementioned solids which conduct Li ions.

44. (new) A composite as claimed in claim 13, wherein the inorganic solid which conducts Li ions is selected from the group consisting of  $\text{Li}_4\text{B}_6\text{O}_{11} \cdot x\text{H}_2\text{O}$ ,  $\text{Li}_3(\text{BO}_2)_3$ ,  $\text{Li}_2\text{B}_4\text{O}_7 \cdot x\text{H}_2\text{O}$ ,  $\text{LiBO}_2$ , where x can be from 0 to 20;  $\text{Li}_2\text{O} \cdot \text{Al}_2\text{O}_3 \cdot \text{H}_2\text{O}$ ,  $\text{Li}_2\text{Al}_2\text{O}_4$ ,  $\text{LiAlO}_2$ ; lithium-containing zeolites, feldspars, feldspar substitutes, phyllosilicates and inosilicates,  $\text{LiAlSi}_2\text{O}_6$  (spodumene),  $\text{LiAlSi}_4\text{O}_{10}$  (petullite),  $\text{LiAlSiO}_4$  (eucryptite),  $\text{K}[\text{Li,Al}]_3[\text{AlSi}]_4\text{O}_{10}(\text{F-OH})_2$ ,  $\text{K}[\text{Li,Al,Fe}]_3[\text{AlSi}]_4\text{O}_{10}(\text{F-OH})_2$ ; lithium zeolites in fiber, sheet or cube form;  $\text{Li}_2\text{C}_2$ ,  $\text{Li}_4\text{C}$ ;  $\text{Li}_3\text{N}$ ;  $\text{LiAlO}_2$ ,  $\text{Li}_2\text{MnO}_3$ ,  $\text{Li}_2\text{O}$ ,  $\text{Li}_2\text{O}_2$ ,  $\text{Li}_2\text{MnO}_4$ ,  $\text{Li}_2\text{TiO}_3$ ;  $\text{Li}_2\text{NH}$ ;  $\text{LiNH}_2$ ;  $\text{Li}_3\text{PO}_4$ ,  $\text{LiPO}_3$ ,  $\text{LiAlFPO}_4$ ,  $\text{LiAl}(\text{OH})\text{PO}_4$ ,  $\text{LiFePO}_4$ ,  $\text{LiMnPO}_4$ ;  $\text{Li}_2\text{CO}_3$ ;  $\text{Li}_2\text{SiO}_3$ ,  $\text{Li}_2\text{SiO}_4$ ,  $\text{Li}_6\text{Si}_2$ ;  $\text{Li}_2\text{SO}_4$ ,  $\text{LiHSO}_4$ , and  $\text{LiKSO}_4$ , and also mixtures of two or more of the abovementioned solids which conduct Li ions.
45. (new) A composite as claimed in claim 13, wherein the first layer or layers and the second layer or layers are joined to one another by the method V1 in the presence of a bonding layer or bonding layers.
46. (new) A composite as claimed in claim 45, wherein the bonding layer or layers is/are formed of polymeric compounds.
47. (new) A composite as claimed in claim 46, wherein the polymeric compounds are selected from the group consisting of polyethylene oxide; polyvinyl ethers; (co)polyacrylates, (co)polymethacrylates; polyvinylpyrrolidone; polyurethanes, wax-like (co)polyolefins; rubber-like materials; and polyisobutylene; and also

mixtures of two or more thereof.

48. (new) A composite as claimed in claim 46, wherein the polymeric compounds are selected from the group consisting of polyethylene oxide; poly(vinyl methyl ether), poly(vinyl ethyl ether), poly(vinyl propyl ether), poly(vinyl butyl ether), poly(vinyl isobutyl ether); polybutyl (meth)acrylate, polyhexyl (meth)acrylate; polyvinylpyrrolidone; polyurethanes, polyethylene, polypropylene waxes, polyisoprene waxes; rubber-like materials; and polyisobutylene; and also mixtures of two or more thereof.

49. (new) A composite comprising

Aa) at least one first layer which comprises a mixture Ia, comprising a mix IIa consisting of

a) from 1 to 95% by weight, based on mix IIa, of an inorganic solid which conducts Li ions, having a primary particle size of from 5 nm to 20  $\mu\text{m}$  and

b) from 5 to 99% by weight, based on mix IIa, of a polymeric composition IV obtained by polymerization of

b1) from 5 to 100% by weight, based on the composition IV, of condensation product V of

$\alpha$ ) at least one compound VI which is able to condense with a carboxylic acid or a sulfonic acid as defined in  $\beta$  or a derivative or a mixture

of two or more thereof, and

- β) at least 1 mol per mol of the compound VI of a carboxylic acid or sulfonic acid VII which contains at least one free-radically polymerizable functional group, or a derivative thereof or a mixture of two or more thereof,

and

- b2) from 0 to 95% by weight, based on the composition IV, of a further compound VIII, having a mean molecular weight (number average) of at least 5000 and polyether segments in the main chain or a side chain, where the proportion by weight of the mix IIa in the mixture Ia is from 1 to 100% by weight, and the layer is free of an electron-conducting, electrochemically active compound,

and

- B) at least one second layer which comprises a polymeric binder and an electron-conducting, electrochemically active compound,

wherein the first layer or layers and the second layer or layers are joined to one another by one lamination of the first layer or layers with the second layer or layers under the action of heat or under the action of heat and pressure, in the

presence of a bonding layer or bonding layers.

50. (new) A composite as claimed in claim 49, wherein the bonding layer or layer is/are formed of polymeric compounds.
51. (new) A process for producing a composite as claimed in claim 49, which comprises joining the first layer or layers and the second layer or layers and bonding layer or layers to one another by hot lamination.
52. (new) A process for producing a composite as claimed in claim 49, which comprises subjecting the first layer or layers or the second layer or layers or the first layer or layers and the second layer or layers to a corona treatment and subsequently bringing together the first corona-treated layer or layers to the second corona-treated or untreated layer or layers.
53. (new) A composite as claimed in claim 45, wherein the bonding layer or layers comprise(s) an inorganic solid which conducts Li ions and polymeric compounds.
54. (new) A composite as claimed in claim 49, the bonding layer or bonding layers comprise(s) and inorganic solid which conducts Li ions and polymeric compounds.
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## REMARKS

### *I. Introduction*

Claims 13, 19, 21, 24, 27, 38, and 42-52 are pending in the present application. In response to the Office Action dated August 19, 2002, applicants have amended claims 13, 19, 21, 24, 38, and have introduced new claims 42-52. For the reasons below, applicants believe they have sufficiently addressed the examiner's art and non-art claim rejections, and respectfully solicit the application to issue.

### *II. Amendment of Claims*

#### A. Response to Claim Rejections under 35 U.S.C. §112, ¶2

The examiner has rejected claims 13, 19, 21, 24, 27, and 38 under 35 U.S.C. 112, ¶2 as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Applicants have amended most of the rejected claims in order to point out and distinctly claim the invention.

Claim 13 has been amended to address the examiner's concerns in ¶¶ 6, 7, and 8 of the Office Action. In ¶6, the examiner was concerned that the phrase "a solid III, preferably a basic solid III" in component a) recited a broad range or limitation together with a narrow range or limitation that falls within the broad range or limitation. Consequently, applicants have replaced "a solid III, preferably a basic solid III" in component a) with "an inorganic solid which conducts Li ions." This amendment is based on page 9, line 15 of the specification.

In ¶7 of the Office Action, the examiner thought it was unclear as to what components the percentages of claim 13 were based on. Consequently, for clarification, "based on mix IIa" has been introduced after "by weight" in component a) and component b).



In ¶8 of the Office Action, the examiner stated that the phrase “obtainable” is not a positive limitation, and that “[i]t is unclear whether or not the polymer b) needs to be a reaction product of b1) and b2). Consequently, “obtainable” has been replaced by “obtained,” and now it should be clear to a person of ordinary skill in the art that polymeric composition IV is a reaction product of b1) and b2) in the range given in claim 13 as a percentage by weight. In other words, composition IV is described by a product-by-process step.

Claims 19 and 21 were rejected as being indefinite because they could be “inconsistent with the parent product-by-process claim” (claim 13). Applicants respectfully disagree. Claims 19 and 21 refer to a process for preparing a composite. Claim 13 refers to a composite comprising several layers. The components of the layers are characterized by way of a product-by-process language. This product-by-process language does not refer to the composite as such, only to component b).

#### B. Response to Rejections of Claims 24 and 38

The examiner has rejected claims 24 and 38 for being improper “use” claims. Claim 24 was rejected under authority of both 35 U.S.C. §112, ¶2 and 35 U.S.C. §101, and claim 38 was rejected only under the authority of 35 U.S.C. §101. Both claims have been amended to address the examiner’s concerns, and are now method claims reciting an “utilizing” step.

United States Patent and Trademark Office precedent allows such method/process claims reciting an “utilizing” step. See *Ex parte Porter*, 25 USPQ2d 1144 (Bd. Pat. App. & Inter. 1992) (Claim was to “A method for unloading nonpacked, nonbridging and packed, bridging flowable particle catalyst and bead material from the opened end of a reactor tube which comprises utilizing the nozzle of claim 7.”) (cited at

MPEP §2173.05(q)). Because claims 24 and 38 have been redrafted in accordance with USPTO precedent, applicants think they are now proper method claims.

#### C. New Claims 42-52

Applicants have introduced new claims 42-52, which are supported by the disclosures in the specification.

Claim 42 depends on claim 13 and further specifies the inorganic solid which conducts Li ions. The features of claim 42 are disclosed on page 9, lines 15-16 of the specification.

Claim 43 also depends on claim 13 and further specifies the inorganic solid which conducts Li ions. New claim 43 is based on page 9, line 19 to page 10, line 2 of the specification.

Claim 44 also depends on claim 13 and further specifies the inorganic solid which conducts Li ions. New claim 44 is based on page 9, line 19 to page 10, line 3 of the specification.

Claim 45 depends on claim 13 and further specifies the lamination step VI. New claim 45 is based on page 35, lines 23 to 27. In claim 45 a third layer – a bonding layer – has been introduced.

Claim 46 depends on claim 45 and further specifies the bonding layer or bonding layers (which is the new feature of claim 45). New claim 46 is based on page 26, lines 1, 2.

Claim 47 depends on claim 46 and further specifies the polymeric compounds, which are the preferred bonding layer or layers as claimed in claim 46. New claim 47 is based on page 27, lines 18 to 26 of the specification.

Claim 48 also depends on claim 46 and further specifies the polymeric

compounds, which are the preferred compounds of the bonding layer or bond layers.

New claim 48 is based on page 27, lines 18 to 26.

New independent claim 49 is based on claim 13 as amended. Claim 13 has been amended by introducing “based on a mix IIa” after “by weight” in component a) and component b). Further, “solid III, preferably a basic solid III” has been replaced by “basic inorganic solid” which conducts Li ions.” This amendment is based on page 9, lines 15-16 of the specification. Further, in compound b) “obtainable” has been replaced by “obtained.” As mentioned above, component b) is characterized by a product-by-process step.

Claim 49 differs from amended claim 13 as follows. The following, found in claim 13, have been deleted in claim 49: “One of the two methods V1 or V2”; “V1”; and the paragraph starting with “V2” and ending with “layers.” At the end of the new claim 49 “in the presence of a bonding layer or bonding layers” has been introduced. This introduction is based on page 35, lines 23 to 27 of the specification.

New claim 50 depends on new claim 49 and further specifies the bonding layer as disclosed on page 26, lines 1, 2 of the specification.

New claim 51 is a process claim and is based on prior claim 19, wherein the dependency “as claimed in claim 13” has been replaced by “as claimed in claim 49.” Further, “if present,” has been deleted.

New claim 52 is based on prior claim 21, wherein the dependency “as claimed in claim 13” has been replaced by “as claimed in claim 49.”

New claim 53 depends on claim 45 and is based on page 25, line 23 and page 26, lines 1-2 of the specification.

New claim 54 depends on claim 49 and is also based on page 25, line 23 and

page 26, lines 1-2 of the specification.

### *III. Claim Rejections Under 35 U.S.C. §103*

The examiner has rejected claims 13, 19, 21, 24, 27, and 38 under 35 U.S.C. §103(a) as being unpatentable over Bronsert *et al.* (WO 97/37397) in view of Koksbang *et al.* (US 5,430,368) and Williams (US 5,523,118). Applicants think that the claims, as amended herein, would not have made the invention as a whole obvious to a person of ordinary skill in the art when the invention was first reduced to practice.

Bronsert *et al.* (US 6,416,905) discloses a mixture Ia which comprises a composition IIa consisting essentially of a) a *basic solid III*, and b) a polymeric mass IV (see claim 1). The composition can be used to form a composite electrochemical film having a first layer comprising an electron conducting electrochemical active compound and a second layer comprising the mixture as mentioned above. The first and second layer can be combined by a commonly used coating process (column 11, lines 60 to 62).

By contrast, amended claim 13 of the present invention discloses a composite comprising at least one first layer which comprises a mixture Ia, comprising a mixture IIa, consisting of a) an *inorganic solid which conducts Li ions (layer A)*, and b) polymeric composition IV, and at least one second layer which comprises a polymeric binder and an electron-conducting, electrochemically active compound (layer B) is claimed.

Bronstert *et al.* is silent as to an inorganic solid which conducts Li ions as a solid III.

According to claim 13, the first layer or layers (A) and the second layer or layers (B) are joined to one another either by lamination or by corona treatment of at least one of said layers and subsequent bringing together there corona-treated layers.

Bronstert *et al.* is also silent as to the specific method of how the first layer (A) and a second layer (B) are joined together.

Koksbang *et al.* discloses a process for *in situ* preparation of an electrode composition (see claim 1, column 14, lines 7, 8). Said electrode composition is used in electrochemical cells and batteries (column 1, lines 6, 7). Such cells are for example manufactured by laminating together an anode layer, electrolyte layer and cathode/current collector layer. Lamination may occur by application of heat and pressure (column 13, lines 12 to 18).

However, Koksbang *et al.* is silent as to a composite material comprising, as components, an inorganic solid, which conducts Li ions (layer A) and a polymeric composition (layer B). This layer A) comprising an inorganic solid which conducts Li ions is not only an electrolyte layer, but also a separating layer, because the layer is free of an electron-conducting, electrochemically active compound. A person skilled in the art knows, that the wording "electrochemically" does mean redox active in the context of the present invention.

Such a composite material comprising a layer A as claimed in amended claim 13 of the present invention is neither mentioned in Bronstert *et al.* nor in Koksbang *et al.*

Williams (US 5,523,118) discloses that a corona-treatment provides a better adhesion between a polymer and other materials coated upon it (column 6, lines 62 to 67). However, Williams also not mention a composite comprising a first layer A) as claimed in the present invention.

The new claim 13 of the present invention is therefore not obvious over Bronstert *et al.* in view of Koksbang *et al.* or Williams.

Also the other claims depending on claim 13 are not obvious in view of Bronstert

*et al.* and Koksbang *et al.* Further, claim 49 is also not obvious in view of Bronstert *et al.* and Koksbang *et al.* or Williams for the same reasons as discussed according to claim 13.


A further difference between claim 49 and Bronstert *et al.* is the presence of a bonding layer or bonding layers in the composite material claimed in claim 49. Such a bonding layer is neither mentioned in Bronstert *et al.* nor in Koksbang *et al.* or Williams. According to new claim 54, the bonding layer comprises an inorganic solid which conducts Li ions and polymeric compounds. Such a bonding layer is able to conduct Li ions, which is important for the function of an electrochemical cell.

#### *IV. Conclusion*

In view of the foregoing amendment and remarks, applicants consider that the rejections of record have been obviated and respectfully solicit passage of the application to issue.

**A check in the amount of \$930.00 is attached to cover the required two month extension fee.**

Please charge any shortage in fees due in connection with the filing of this paper, including Extension of Time fees to Deposit Account No. 11-0345. Please credit any excess fees to such deposit account.

Respectfully submitted,  
KEIL & WEINKAUF  
  
Herbert B. Keil  
Reg. No. 18,967

1350 Connecticut Ave., N.W.  
Washington, D.C. 20036  
(202) 659-0100  
HBK/PBS/kas